DOCUMENT RESUME

ED 063 406 TM 001 733

TITLE	Extruder Operator (plastics mat.) 6-51.468--Technical Report on Standardization of the General Aptitude Test Battery.
INSTITUTION	Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service.
REPORT NO	TR-S-221
PUB DATE	Feb 63
NOTE	7p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Aptitude Tests; *Cutting Scores; Evaluation Criteria; Job Applicants; *Job Skills; *Machine Tool Operators; Norms; Occupational Guidance; *Personnel Evaluation; Plastics; Test Reliability; Test Validity
IDENTIFIERS	Extruder Operator; GATB; *General Aptitude Test Battery

ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is also included. (AG)

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TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

EXTRUDER OPERATOR (plastics mat., FABRIC. PLASTICS PROD.)

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U. S. Employment Service in
Cooperation with
New Jersey State Employment Service

TM 001 733

February 1963

GATB #237

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

EXTRUDER OPERATOR (plastics mat.) 6-51.468

B-496

Summary

The General Aptitude Test Battery, B-1002A, was administered during the period of November 1959 to March 1961 to a final sample of 57 males employed as Extruder Operators (plastics mat.) 6-51.468 by the Celanese Corporation of America and the Poly Plastic Products Company, both of Paterson, New Jersey. The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlations with the criterion, job analysis data, and their combined selective efficiency, Aptitudes Q-Clerical Perception, K-Motor Coordination and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Extruder Operator 6-51.468, B-496.

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
Q	CB-1- B	90	Q	Part 1	90
T	CB-1- G CB-1- K	80	K	Part 8	85
M	CB-1- M CB-1- N	105	M	Part 9 Part 10	100

Effectiveness of Norms

The data in Table IV indicate that 14 of the 19 poor workers, or 74 percent of them, did not achieve the minimum scores established as cutting scores on the recommended test norms. This shows that 74 percent of the poor workers would not have been hired if the recommended test norms had been used in the selection process. Moreover, 27 of the 32 workers who made qualifying test scores, or 84 percent, were good workers.

TECHNICAL REPORT

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Extruder Operator 6-51.468.

II. Sample

The General Aptitude Test Battery, B-1002A, was administered to a sample of 74 male workers employed as Extruder Operators (plastics mat.) 6-51.463 at the Celanese Corporation of America and the Poly Plastic Products Company, both of Paterson, New Jersey. Seventeen cases were eliminated on the basis of consideration such as limited time on the job, inability to develop adequate supervisory ratings, and testing problems.

All employees were exposed to a training program which generally followed the following pattern: 3 to 4 weeks of supervised training by the foreman followed by another 3 to 4 weeks of close observation, and finally another 3 to 4 weeks to conclude the probationary period. Two and one half months to three months time on the job was considered necessary for a trainee to completely learn the job. All individuals in the sample have at least 3 months experience.

The selection of employees had no formal pattern but was based on prior experience and an interview. The management stated that they generally tried to get high school graduates but this varied with the labor market situation and it was not uncommon for them to hire non-graduates. A stable work history in a comparable factory was very desireous.

TABLE I

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

N = 57	M	σ	Range	r
Age (years)	29.8	6.6	20-47	.065
Education (years)	10.9	1.4	8-14	.413**
Experience (months)	28.9	19.3	3-80	.447**

**Significant at the .01 level

Correlations significant at the .01 level exist between education and experience and the criterion. This indicates that the raters (1) had a tendency to give higher ratings to employees with more education and experience or (2) that those workers actually performed better on the job.

III. Job Description

Job Title: Extruder Operator (plastics mat.) 6-51.468.

Job Summary: Operates a multiple winding type extruding machine to produce polyethylene film in accordance with specifications and employer standards regarding clarity, toughness, treatment, gauge, width, roll contour, slip and antiblock and packaging. Obtains assignment and work sheet instructions from foreman. Reviews work specifications and prepares for operation of appropriate machine. Sets air pressure, adjusts gages and rollers for appropriate tension and gauge of film required, and feeds resin material into hopper of machine. Systematically starts winding of film by placing empty roll on mandrel and overlapping end of film onto roller, while setting footage meter to obtain customer specifications. Observes extruding operation to insure quality and conformance with specifications. Takes intermittent micrometer readings of film to determine gauge, and makes other checks and adjustments as may be required. Upon obtaining required footage of film, removes sample of film by cutting across width with scissors, removes wound roll from mandrel, reloads mandrel with empty roll, and continues extruding until specifications are met. Records production on appropriate work sheet form and prepares material for packaging and disposal, as required.

IV. Experimental Battery

All the tests of the GATB, B-1002A, were administered to the sample group.

V. Criterion

The criterion consisted of supervisory ratings on USES Form SP-21, "Descriptive Rating Scale." Two sets of ratings were obtained, with a two week interval between ratings. A reliability coefficient of .95 was obtained for the criterion. Therefore, the final criterion consisted of the average (rounded to the nearest whole number) of the two ratings for each individual in the sample. The range of final criterion scores was 12-42, with a mean of 30.3 and a standard deviation of 6.6

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis:

The job analysis indicated that the following aptitudes measured by the GATB appear to be important for this occupation:

N-Numerical - required in figuring roll weights, yardage and machine output.

P-Form Perception - required in observing the extruding operation to insure quality and conformance with specifications.

Q-Clerical Perception - required in taking micrometer readings, preparing customs orders, and maintaining production records.

F-Finger Dexterity and M-Manual Dexterity - required in manipulation of production materials and machine controls.

On the basis of the job analysis data, V-Verbal Aptitude was rated "irrelevant" for successfully performing the duties of the job.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 57

Aptitudes	M	σ	r
G-Intelligence	101.8	18.9	.194
V-Verbal Aptitude	99.6	18.6	.149
N-Numerical Aptitude	99.5	20.4	.175
S-Spatial Aptitude	104.1	18.9	.196
P-Form Perception	101.0	17.3	.087
Q-Clerical Perception	103.9	18.1	.260
K-Motor Coordination	104.0	14.6	.292*
F-Finger Dexterity	94.8	18.9	.364**
M-Manual Dexterity	112.8	18.4	.198

**Significant at the .01 level
*Significant at the .05 level

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important			x		x	x		x	x
Irrelevant		x							
Relatively High Mean				x		x	x		x
Relatively Low Sigma							x		
Significant Correlation with Criterion							x	x	
Aptitudes to be Considered for Trial Norms						Q	K	F	M

Trial norms consisting of various combinations of Aptitudes Q,K,F and M with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of Q-90, K-85 and M-100 had the best selective efficiency.

VII. Validity of Norms (Concurrent)

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 33 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes Q, K and M with critical scores of 90, 85 and 100, respectively, and the dichotomized criterion for Extruder Operator 6-51.468. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for Extruder Operator 6-51.468.
(Q-90, K-85, M-100)

N = 57	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	11	27	38
Poor Workers	14	5	19
Total	25	32	57

Phi Coefficient = .42
χ^2 = 10.294
P/2 < .005

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes Q, K and M with minimum scores of 90, 85 and 100, respectively, have been established as B-1002 norms for the occupation of Extruder Operator 6-51.468. The equivalent B-1001 norms consist of Q-90, T-80 and M-105.

IX. Determination of Occupational Aptitude Pattern

The specific norms established for this study did not meet the requirements for incorporation in any of the existing 35 occupational aptitude patterns (revised 10/61). The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.